CITY OF RUTLAND
WATER TREATMENT PLANT
RUTLAND, VERMONT

1.8 MGD MIEX® Treatment System Budgetary Proposal

DATE: APRIL 12, 2012
DOCUMENT NO: MR-2012-04
REVISION: 0

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GENERAL INFORMATION

This Proposal outlines Orica Watercare Inc.'s scope of supply and commercial conditions of sale for the equipment supply of one (1) set of MIEX® Treatment Plant equipment capable of treating 1.8 million gallons per day at 1000 BV based on the following referenced specifications and operating conditions.

Plant Operating Variables	Design Quantity
Treatment Capacity (max.)	1.8 MGD
Contactor Hydraulic Detention Time (min.)	4-6 minutes
Contactor Resin Concentration	200 mL/L
Resin Regeneration Rate	1.0 gal resin per 1,000 gal water treated

SCOPE OF SUPPLY

Equipment Package with Regeneration System (1.0 gal / 1,000gal)

Equipment components for one (1) MIEX® Treatment System rated at 1.8 MGD capacity as described herein shall include the following:

A. Contactor Modules

Description: Two (2) complete HR Contactor Modules, vessels constructed from FRP, with approximate dimensions 11ft (DIA) x 19ft (OAH) shall be supplied by ORICA. The following equipment will be supplied by ORICA as part of the HR Contactor Module unless otherwise specified, installation BY OTHERS.

Equipment Supplied:

- HR Contactor Vessels: Two (2) HR Contactor Module vessels constructed from FRP. Vessels shall be built to ANSI/AWWA D120-02. Vessels shall have one (1) 24" diameter manway per vessel. Each vessel shall include:
  - Two (2) sets of plastic tube settlers installed in each vessel.
  - One (1) set of distribution laterals constructed of PVC installed in each vessel.
  - One (1) set of collection launders constructed of FRP installed in each vessel.
  - One (1) circulation pump and associated valves (three isolation, one drain and one check), instruments and controls
  - One (1) loaded resin air lift (one isolation valve and one drain valve)
  - One (1) insertion style electromagnetic flowmeter
  - One (1) set of sample valves (qty 4)
  - One (1) set of drain valves (qty 2)

NOTE: Raw water and treated water piping, Ductile Iron (DI) isolation valves, DI check valves and controls to each Contactor vessel and interconnecting piping from each Contactor vessel to the Polishers, regeneration equipment, drains, vents, etc. shall be BY OTHERS.

NOTE: All valve, instrument and component count are estimated to be confirmed during final design.

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B. Resin Regeneration Module

Description: One (1) complete resin regeneration packaged plant skid module capable of regenerating 1,800 gallons of resin per day. The following equipment will be part of packaged regeneration skids (2 per) supplied by ORICA. Site setting and installation of skid module and all interconnections BY OTHERS.

Equipment Supplied:

- Resin Regeneration Vessels: Two (2) regeneration vessels of approximate dimensions ϕ4.0ft x 9.0ft (H) constructed from FRP.
- Vessel Agitator: Two (2) regeneration vessel agitator units (with standard TEFC motor, gearbox, 316 stainless steel shaft and impeller). One unit per vessel.
- Underdrain Pump: Two (2) air operated, non-metallic diaphragm underdrain pumps used for separating resin / liquid, constructed from plastic.
- Level Transmitter: Two (2) vessel radar level transmitters (one per tank).
- Conductivity Probes: Two (2) conductivity probes and transmitters for the vessel underdrain system (one per tank).
- Fresh Resin Pump: Two (2) low shear pump (one installed on one skid, one shelf spare) for transferring fresh resin from the regeneration vessels to the fresh resin splitter box. The pump motor will be standard TEFC (valves: one actuated, three manual and one check).
- Air Actuated Process Valves: A set of air operated actuated valves with position feedback for each resin vessel; valves constructed from PVC / EPDM. Actuator will be of polycarbonate / plastic construction (qty 11).
- Manual Process Valves: A set of manual operated valves; valves constructed from PVC / EPDM (two isolation and one sample).
- Skid Frame: One (1) Aluminum skid frame for mounting vessels, mixers, instruments, valves, pumps, associated piping and controls. Regeneration skid may be fitted with FRP access stair and platform treads, aluminum handrails, kick plates, etc. for viewing into regeneration tanks.
- Resin Process Piping: One (1) set of piping for resin duties on the regeneration skid to distribute resin to and from the regeneration vessels. Piping and fittings constructed from Sch 80 PVC.
- Brine Process Piping: One (1) set of piping for brine duties on the regeneration skid to distribute brine to and from the regeneration vessels. Piping and fittings constructed from Sch 80 PVC.
- Service Water Piping: One (1) set of piping for service water duties on the regeneration skid to distribute service water to and from the regeneration vessels. Max services water pressure 75 psig (w/ valves: three actuated and one PRV).

NOTE: All valve, instrument and component count are estimated to be confirmed during final design.

C. Other Resin Regeneration and Support Components

Description: One (1) set of additional resin regeneration components. The following equipment components are stand-alone items supplied by ORICA. Site setting and installation BY OTHERS.

Equipment Supplied:

- Loaded Resin Transfer Tank: A single shared 750 gal. Loaded Resin tank (for feeding resin to regeneration skid) constructed from HDPE, tank manufacturer's support stand constructed from coated steel. Fabricated structural stand constructed from Aluminum. Total of one (1) will be provided. Installation BY OTHERS.
- Fresh Resin Splitter: A single shared 12" diameter splitter constructed from PVC. Installation and supports BY OTHERS.
- Salt Saturator Equipment: One (1) set of equipment for a salt saturator tank. Saturated brine pump and associated piping/valving will be provided to be installed BY OTHERS.
  - One (1) 20 Ton salt saturator tank with all required nozzles constructed from FRP. Vessel

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of flat bottom and dished top design; with access ladder with cage; necessary internal components; translucent strip; anchor chairs or tie downs; lifting lugs; dust collection bag.
  - One (1) non-metallic centrifugal pump for transferring saturated brine to the resin regeneration module and the Reuse Brine Tank, with standard TEFC motor.
  - One (1) pressure transducer for regulating water flow to saturator w/ isolation valve.
  - One (1) vessel high level switch.
  - One (1) 24" side mounted manway for vessel access.
  - One (1) set of air operated actuated valves with position feedback for the brine vessel skid; valves constructed from PVC / EPDM. Actuator will be of polycarbonate / plastic construction (qty 2).
  - One (1) set of manual valves; valves constructed from PVC / EPDM (qty 7).

- Virgin Resin System: One (1) virgin resin handling system. Virgin resin pump and associated piping/valving will be supplied on an Aluminum support frame:
  - One (1) resin container interface device with slurry attachment
  - One (1) virgin resin eductor for transferring from the tank to the resin regeneration module.
  - One (1) set of air operated actuated valves with position feedback; valves constructed from PVC / EPDM. Actuator will be of polycarbonate / plastic construction (qty 2).
  - One (1) set of manual valves; valves constructed from PVC / EPDM (qty 3).
- Reuse Brine Tank: One (1) set of equipment for a brine tank and pump. Tank and pump to be installed on concrete foundation BY OTHERS. Brine pump and associated instrumentation/valving will be supplied:
  - One (1) ~2,000 gal mixed brine tank with all required nozzles constructed from HDPE
  - One (1) brine tank ultrasonic level transmitter.
  - One (1) brine tank high level switch.
  - One (1) brine tank conductivity probe and transmitter.
  - One (1) centrifugal pump for transferring brine to the resin regeneration module.
  - One (1) set of air operated actuated valves with position feedback; valves constructed from PVC / EPDM (qty 1).
  - One (1) set of manual valves; valves constructed from PVC / EPDM (qty 4).
- Compressed Air Equipment: One (1) set of compressed air equipment rated for 65 cfm at 125 psig with 15 HP rated motor.
  - One (1) rotary screw air compressors and air receiver tank.
  - One (1) low sound enclosure.
  - One (1) coalescing pre-filter unit (prior to drying).
  - One (1) automatic condensate drain for the receiver tank.
  - One (1) integrated refrigerated air drier.
  - One (1) low air pressure switch.
  - One (1) set of piping and manual valves for compressor equipment, to be installed at the compressor. Valves constructed from carbon steel / EPDM. Valves type 3 piece ball threaded ends.
  - Other features; safety relief valve; high temperature shutdown, motor starter.

NOTE: All valve, instrument and component count are estimated to be confirmed during final design.

D. MIEX® Plant Control System

Description: One (1) control system for operation of the MIEX® Treatment plant and equipment supplied by ORICA herein. The following equipment is stand-alone items supplied by ORICA. Site setting and installation BY OTHERS unless otherwise specified.

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Equipment Supplied:

- Main Control Panel: One (1) NEMA 12 electrical panel fabricated of coated steel containing.
  - One (1) set of power distribution equipment; contactors; circuit breakers, fuses etc.
  - Variable frequency drive units for the recirculation pumps and mixers.
  - Motor starter contactor equipment, as required.
  - Allen Bradley CompactLogix Programmable Logic Controller (PLC) equipment (i.e. PLC module, analog inputs/outputs, digital inputs/outputs). Programming in Logix 5000 software (runtime).
  - One (1) PanelView 15" Touchscreen HMI operator interface (or equal), 3.0GHz CPU, 2GB RAM, 40GB HDD, PCI Slot, CDRW/DVD and Factory Talk software (runtime)
- Remote Panels: As required, NEMA 4X remote electrical panels fabricated from stainless steel. Field wiring and conduit to the remote panels (power and control) shall be BY OTHERS.

E. Resin Inventory

General: The initial MIEX® Inventory is included.

Product Supplied:

- Fifteen (15) 650 L MIEX® Resin Bulk Containers – Initial Resin Inventory.

Note: Site unloading, storage and handling of resin containers BY OTHERS. Contractor to provide labor support during resin loading.

F. Regeneration Salt

General: Salt for resin regeneration is NOT INCLUDED. The initial and ongoing salt supply shall be BY OTHERS. NOTE: Supply and installation of any quartz rock (or other media), if needed, in the base of the saturator vessel shall be BY OTHERS

Salt shall be pelletized solar or evaporative type without additives.

G. Spare Parts: OPTIONAL

Description: The system can be delivered with a set of spare parts. These parts shall be delivered with the equipment and stored on-site by the Owner.

Equipment Supplied:

- Spare Parts: One (1) set of spare parts per the Specification, including:
  - Fresh Resin Pump Set: One (1) low shear pump for transferring fresh resin from the regeneration vessels to the fresh resin splitter box. The pump motor will be standard TEFC.
  - Regeneration Mixer Gear Motor: One (1) each
  - Compressor Spares: One (1) Air Filter, One (1) Oil Filter, Five (5) Gallons Lubricating Oil
  - Blower Spares: One (1) Set Blower Belts, One (1) Quart Oil
  - Underdrain: One (1) Set Underdrain Laterals
  - Level Instrument: One (1) Radar Level Sensor with Transmitter
  - Pressure Sensor: One (1) Polishing Unit Pressure Sensor
  - Conductivity Instrument: One (1) Conductivity Sensor with Transmitter
  - 1" Pneumatic Ball Valve: Four (4) each
  - 1-1/2" Pneumatic Ball Valve: Four (4) each
  - 2" Pneumatic Ball Valve: Four (4) each
  - Ring Seal Kit: One (1) each – 1" Valve
  - Ring Seal Kit: One (1) each – 1-1/2" Valve
  - Ring Seal Kit: One (1) each – 2" Valve
  - 1" Manual Ball Valve: Five (5) each
  - 1-1/2" Manual Ball Valve: Seven (7) each

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- 2" Manual Ball Valve: Four (4) each
- 4" Manual Butterfly Valve: One (1) each
- VFD Drive: One (1) each 1/3 HP – Regeneration Mixer
- VFD Drive: One (1) each 5 HP – Fresh Resin Pump

H. Field Service

General: Up to two (2) trips and four (4) days will be provided during design and construction to provide technical advice with facility design and installation of Orica supplied equipment. No PHYSICAL WORKS to assist with site installation works and media loading are included in this proposal.

A total of twenty (20) working days shall be provided in a total of one (1) trips during commissioning and start-up to carry of out the following works with site operations staff:

- Initial dry testing and water testing of plant components.
- Assist with loading of MIEX® resin and magnetite into the process.
- Introduction of MIEX® resin into the treatment process.
- Start-up and initial operation of the MIEX® treatment plant.
- Assist with onsite water quality checks to verify performance of MIEX® Treatment system, as applicable.
- Onsite training of operations staff on the operation and maintenance requirements of the MIEX® Plant.

Sufficient notice of 20 working days shall be made to ORICA prior to scheduling travel for commissioning and start-up.

I. Documentation

General: System will be delivered with a full Operations and Maintenance Manual including P&ID's, High level plant design drawings, process equipment cut-sheets and operation/maintenance manuals, and other system information.

J. General Comments/Clarifications on Equipment Supply

General: Skid Structure: Equipment skids are constructed from Aluminum unless otherwise specified.

Skid Process Piping: Process piping and fittings that is pre-fabricated on equipment skids shall be constructed from:

- Sch 80 PVC for process water duties.
- Sch 80 PVC for MIEX® resin duties.
- Sch 80 PVC for brine duties.
- Sch 80 PVC for service water duties.
- 316 Stainless steel pipe/tube for compressed air (for main header line); and poly tubing for individual lines to equipment items (i.e. from brass solenoid valve to air actuated valve).

Skid Anchors: All equipment skids are designed with footing pads and hold-down features. ALL hold down bolts (anchors), washers, nuts and grout for leveling skids shall be BY OTHERS.

Electrical Assembly of Equipment Skids: The equipment skids will be pre-wired in the shop as much as practical. Field wire tie-points to equipment skids will be terminated in junctions boxes installed on the equipment skids.

HMI Programming: The human machine interface (HMI) software and necessary programming requirements will be supplied and installed. Any additional programming for integration into existing

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site SCADA system shall be BY OTHERS. HMI screens and tag data will be shared with the Owner for integration into the virtual master system.

PLC Programming: The necessary programmable logic controller (PLC) programming for the MIEX® Treatment Plant will be supplied in ladder logic format based on Allen Bradley components.

OTHER ITEMS AND WORKS NOT SUPPLIED BY ORICA

ORICA'S Scope of Supply DOES NOT include the following equipment items, installation works or any other items that have not been described herein, unless specifically noted.

A. Site Setting and Installation of ORICA Supplied Equipment

General: The following items or works have NOT BEEN INCLUDED:

- The unloading, storage and handling of process equipment items supplied by ORICA shall be BY OTHERS.
- All labor, materials, consumables, construction facilities, site setting and installation of process equipment items supplied by ORICA shall be BY OTHERS.
- The design, supply and installation of any interconnecting piping and cabling between ORICA supplied process equipment items, unless specifically noted, shall be BY OTHERS.

B. Contactor and Polisher Modules

General: The following items or works have NOT BEEN INCLUDED:

- The design and construction of any concrete basins/tanks and concrete foundations for ORICA supplied equipment or other services required shall be BY OTHERS.
- The design and construction of any buildings or structures to house the ORICA supplied equipment shall be BY OTHERS.
- The design, supply and installation of any covers and ventilation, unless specifically noted shall be BY OTHERS.
- The supply and installation of any general equipment for general power outlets, visual lighting, electrical earthing wiring and lightning conductors etc around the contactor modules and access stairs / walkways shall be BY OTHERS.
- The supply and installation of any protective coatings on concrete foundation/structures shall be BY OTHERS.
- The supply and installation of interconnecting piping between Orica supplied equipment.
- The supply and installation of Polisher backwash water pump(s) and flow instrumentation.

C. Raw Water and MIEX® Treated Effluent

General: The following items or works have NOT BEEN INCLUDED:

- The supply and installation of any piping, fittings and controls to and from the MIEX® Plant boundary; or to and from any upstream or downstream process equipment shall be BY OTHERS.
- The supply and installation of any transfer pumps, automated controls, instruments, electrical equipment, civil structures, buildings, etc. shall be BY OTHERS.
- The supply of any standalone or online water quality instruments or devices (such as but not limited to TOC, DOC, UV, Color) shall be BY OTHERS.

D. Resin Regeneration Equipment

General: The following items or works have NOT BEEN INCLUDED:

- The design and construction of concrete foundations or structures shall be BY OTHERS.

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- The design and construction of any buildings or structures to house regeneration equipment supplied by ORICA shall be BY OTHERS.
- The supply and installation of any protective coatings on concrete structures shall be BY OTHERS.
- Skid anchors shall be supplied and installed BY OTHERS.

E. Waste Brine Equipment

General: The following items or works have NOT BEEN INCLUDED:

- The supply and installation of waste brine storage tanks, pumps, instruments, valves, etc. shall be BY OTHERS.
- The supply and installation of any waste brine treatment equipment or processes shall be BY OTHERS.
- Services for removal and disposal of any accumulated/stored waste brine from the MIEX® process shall be BY OTHERS.

F. Electrical / Instrumentation

General: The following items or works have NOT BEEN INCLUDED:

- The supply and installation of power supply cabling / equipment to the MIEX® Plant location shall be BY OTHERS.
- The supply and installation of any additional equipment required for a Motor Control Center (MCC) room; building or structures shall be BY OTHERS.
- Field installation, conduit, wiring terminations, etc. of ORICA supplied electrical equipment (e.g. motors, instruments, electrical panels, etc.) shall be BY OTHERS.
- Any components, wiring, software required for integrating an existing PLC / SCADA control system and remote communications with the MIEX® control system shall be BY OTHERS.

G. Services / General

General: The following items or works have NOT BEEN INCLUDED:

- Necessary permits and/or governmental agency approval shall be BY OTHERS.
- The supply and installation of a potable water supply, valves, back flow prevention, pressure regulation to the MIEX® Plant location shall be BY OTHERS.
- The supply and installation of a compressed air piping, valves and controls shall be BY OTHERS.
- The supply and installation of any floor drainage, storm water or other underground drainage shall be BY OTHERS.
- The supply and installation of any general operator amenities, office equipment, laboratory equipment etc shall be BY OTHERS.
- Raw Water entrained/dissolved gas shall be quantified and are generally not acceptable.
- Provisions for raw water grit or other foreign solid material removal shall be BY OTHERS.

H. Spare Parts

General: The following items or works have NOT BEEN INCLUDED:

- Any online spare pumps, valves, instruments, etc. that have not been specified herein shall be BY OTHERS.
- Any individual spare pumps, valves, instruments, etc. that have not been specified herein shall be BY OTHERS.

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